# VOROB'YEV, A.A. Light refraction in crystals and the ionic bond energy. Dokl.AV SSSR (MLRA 10:2) 12 no.1:53-54 Js '57. 1. Tomskiy politekhnicheskiy institut imeni S.M.Kirova. Predstavleno akademikom A.F.loffe. (Refraction) (Ionic crystals--Optical properties)

# "APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001860810019-7

1. Politekhnicheskiy institut, Tomsk. (Electric discharges through gases)	Oroby VOROB	YEW, A.A.; KALGANOV, A.F.  Energy relations in the electric summary in English). Zhur.fiz.l	cal spark-over of gases (with khim.31 no.7:1455-1458 J1 '57. (MIRA 10:12)	POE PACE
			Pomak.	

PA - 1916

VOROBYEV, AA.

SUBJECT AUTHOR

USSR / PHYSICS

CARD 1 / 2

The Refraction of Light in Crystals and the Energy of the

Binding among Ions. TITLE

Dokl. Akad. Nauk, 112, fasc. 1, 53-54 (1957)

PERIODICAL

The amount of the refraction coefficient of the electromagnetic waves of the dielectricum is connected with the excitation of the particle of the dielectricum to oscillations, and therefore with the energy of the binding of these particles in the lattice. The passage of visible light through the crystal causes the electrons to oscillate and the refraction coefficient characterizes the energy of the binding of the electrons in the crystal. If the binding energy of the electrons in the crystal is increased, their enforced oscillations and also the refraction coefficient become smaller. Near self-absorption the dispersion curve moves away from the side of the long waves as a result of the rapid increase of the refraction coefficient. The passage of light is accompanied by a weak interaction with the electrons of the dielectricum. If the energy of the light wave is small compared to the energy of electron binding, the refraction coefficient becomes smaller if lattice energy increases on the occasion of transition from KJ to Lif. From the beginning of the halide group (Li) the refraction index no of the crystals of the halide compounds diminishes down to the end of the group (Ca). nD increases with an increase of electron polarization of the anion on the occasion of transi-

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CARD 2 / 2

PA - 1916

Dokl.Akad.Nauk, 112, fasc. 1, 53-54 (1957) A further diagram illustrates the dependence of the refraction index on lattice energy for the monocrystals of the metals of the second group: BeO, MgO and CaO. The refraction index of SrO is unknown. For the monocrystals of BaO the refraction index was determined from the condition  $\xi^2 = n^2$ . The dielectricity constant was measured by the displacement method in the interval uf up to 60 kc by means of a Q-meter. With an increase of frequency from 1 to 1000 kc the dielectricity constant diminishes from 50 to 34. As this value of the dielectricity constant (if frequency is further increased) does not change any further, the author puts  $n = \sqrt{34} = 5.8$ . According to experimental data the refraction index of crystals diminishes with an increase of the energy of the lattice. The dependence of the refraction coefficient on chemical composition can be used for the purpose of testing material properties.

INSTITUTION: Polytechnic Institute "S.M.KIROV", Tomsk.

VOROBYEV A.A

VOROBYEV, B A. A. and SAVINTSEV, P. A.

"Mechanical Properties of Ionic Crystals."

This paper presented at the Conf. on Mechanical Properties of Non-Metallic Solids, LEningrad, USSR, 19-26 May 58.

Polytechnical Institute, Tomsk.

### "APPROVED FOR RELEASE: 03/14/2001

CIA-RDP86-00513R001860810019-7

DROB YEV, A. A.

Vorob'yev, A. A. and G.A. Vorob'yev [Tomsk, Politekhnichskiyy institut (Polytechnical Institute)] On Several Processes in the Electrical Breakdown of Solid Dielectrics

Vorob'yev, A.A. and G.A. Vorob'yev [Tomsk, Politekhnichskiy institut (Polytechnical Institute)] Electrical Disruption of Rock Salt Containing Coloration Nuclei

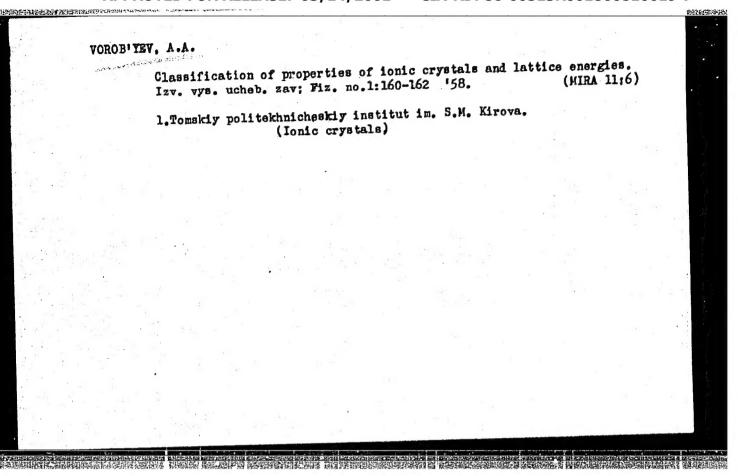
(The Physics of Dielectrics; Transactions of the All-Union Conference on the Physics of Dielectrics) Moscow, Izd-vo AR SSSR, 1958. 245 p. 3,000 copies printed.

This volume publishes reports presented at the All-Union Conference on the Physics of Dielectrics, held in Dnepropetrovsk in August 1956, sponsored by the "Physics of Dielectrics" Laboratory of the Pizicheskiy institut imeni Labedeve An SSSR (Physics Institute ineni Labedev of the AS USSR), and the Electrophysics Department of the Dnepropetrovskiy gosudarstvennyy universitet (Dnepropetrovsk State University).

VOROB'IEV. A.A.: VOROB'IEV, G.A.

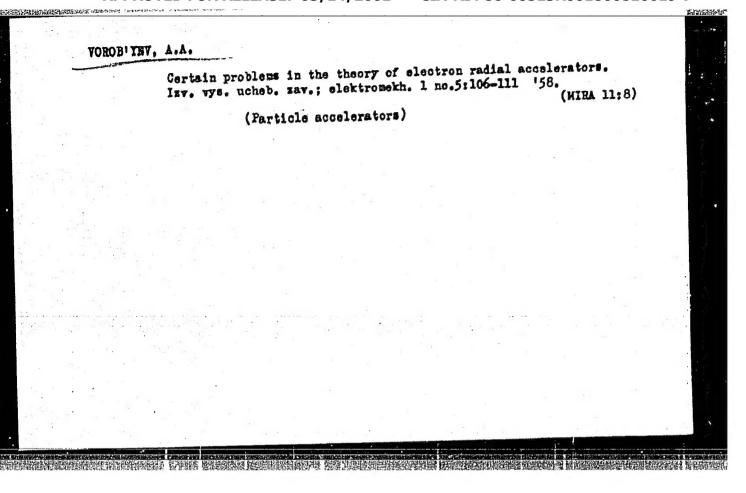
lonisation spark-through in solid dielectrics. Izv. vys. ucheb. zav.;
(MIRA 11:6)
Fig. no.1:120-123 '58.

l.Tomskiy politekhnichekskiy institut imeni S.M. Kirova.
(Dielectrics)



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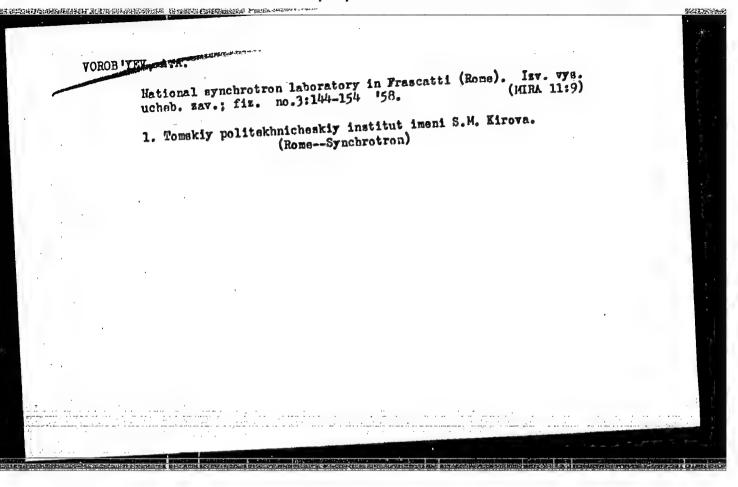


VOROB'YEV, Aleksandr Akimovich, doktor fis.-mat.nauk, prof.

Certain problems in the design of cyclic accelerators with a closed wave guide. Isv.vys.ucheb.zav.; elektromekh. 1 no.11: 13-19 '58.

1. Direktor Tomskogo politekhnicheskogo instituta.

(Particle accolerators) (Wave guides)



80V/139-58-4-28/30

AUTHOR:

Vorob'yev, A. A.

TITLE:

Accelerator Laboratory of the Physics Institute of Turin University (Uskoritel'naya laboratoriya fizicheskogo

instituta universiteta v Turine)

PERIODICAL: Izvestiya Vysshikh Uchebnykh Zavedeniy, Fizika,

1958, Nr 4, pp 167-171 (USSR)

ABSTRACT: A description is given of the laboratory based on the

information gained during a visit by the author. There are 5 figures.

ASSOCIATION: Tomskiy politekhnicheskiy institut imeni S. M. Kirova (Tomsk Polytechnical Institute imeni S. M. Kirov)

SUBMITTED: March 27, 1958

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CIA-RDP86-00513R001860810019-7" APPROVED FOR RELEASE: 03/14/2001

SOV/139-58-4-29/30

AUTHORS: Vorob'yev, A. A. and Andreyev, G. A.

TITLE: Thermal Breakdown of lonic Crystals and the Lattice Energy (Teplovoy proboy ionnykh kristallov i energiya reshetki)

PERIODICAL: Izvestiya Vysshikh Uchebnykh Zavedeniy, Fizika, 1958, Nr 4, pp 172-173 (USSR)

ABSTRACT: Paper presented at the Inter-University Conference on Dielectrics and Semiconductors, Tomsk, February, 1958. At room temperature a direct relation exists between the electric properties of the crystals and their lattice energy (Refs 1-4). The authors of this paper investigated the electric strength and the current in strong and pre-breakdown fields in single crystals of NaCl, KCl and KBr inside a uniform field in the temperature range 20 to 440°C. In the temperature range 25 to 440°C the electric strength of NaCl, KCl and KBr increases in proportion to the energy of the crystal lattice, Fig.1. With increasing energy of the crystal lattice, the pre-breakdown current at elevated temperatures decreases according to the linear law, Fig.2; the linear dependence of the current measured at fields equalling 20 to 100% of the breakdown fields on the energy of the crystal lattice

SOV/139-58-4-29/30 Thermal Breakdown of Ionic Crystals and the Lattice Energy

is conserved in the temperature range 100 to 440°C in NaCl, KCl and KBr. The Volt-Ampere-sec characteristics obtained for each of the specimens of the investigated salts (Ref 6) were used for calculating the electrical energy generated in the specimen during the action of the high voltage, i.e. from the beginning of an increase in the high voltage up to the instant of breakdown of the specimen. In the temperature range 20 to 440°C a decrease of the electric energy was observed with the following sequence NaCl, KCl, KBr. Thus, during a thermal breakdown crystals with lower energies of the crystal lattice have a lower electric strength and require a smaller quantity of electric energy for effecting the breakdown. relation between the electric strength and the physicochemical properties of the crystals is maintained in the In Fig.1 the dependence field of the thermal breakdown. is graphed of the electric strength of NaCl, KCl, KBr on the energy of the crystal lattice at the temperatures 25 to 350°C (top graph) and 400 to 440°C (bottom graph).

In Fig. 2 the dependence of the pre-breakdown current on the energy of the crystal lattice is graphed for the NaCl. Card 2/3the energy of the crystal lattice is graphed for the NaCl,

80V/139-58-4-29/30 Thermal Breakdown of Ionic Crystals and the Lattice Energy

KCl and KBr at the temperatures of 100 to 250°C (top graph) and 300 to 440°C (bottom graph). There are 2 figures and 4 references, all of which are

Soviet.

(Note: This is a complete translation)

ASSOCIATION: Tomskiy politekhnicheskiy institut imeni S.M.Kirova (Tomsk Polytechnical Institute imeni S. M. Kirov)

SUBMITTED: February 25, 1958

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CIA-RDP86-00513R001860810019-7" APPROVED FOR RELEASE: 03/14/2001

VOROB'YEV, A.A.

89-3-1/30

AUTHORS:

Voroblyev, A. A. , Moskalev, V. A.

TITLE:

The Investigation and the Development of Cyclic Accelerators at the Tomsk Polytechnical Institute (Issledovaniya i razrabotki elektronnykh tsiklicheskikh uskoriteley v Tomskom politekhnicheskom institute)

PERIODICAL:

Atomnaya Energiya, 1958, Vol. 4, Nr 3, pp. 229 - 237 (USSR)

ABSTRACT:

In 1946 the design and the construction of a betatron was started at Tomek.

In 1948 a 5 MeV betatron (the electromagnetic windings being supplied by a 500 cycles alternating current) as well as a puplied by a 500 cycles alternating current) as well as a supplied by a 500 cycles alternating current) as well as a mainternating current) were finished and put into operation. Within the period from 1949 to 1955 a number of betatrons up to 15 MeV were finished and put into operation. Within this period also a 25 MeV betatron was constructed which has an increased radiation intensity and the single aggregates of which operate considerably more stable. From 1955 to 1956 a few of these apparatus were built. The most important para-

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89-3-1/30

The Investigation and the Development of Cyclic Accelerators at the Tomsk Polytechnical Institute

meters as well as the details of construction of some betatrons are discussed. Different possibilities are shown to deflect an electron beam out of the betatron. The 25 MeV betatron is partly described more in detail. The authors shortly report on how to use ring-shaped acceleration electrodes in a 30 MeV synchrotron. These electrodes are connected with the external double-resonance line. There are 10 figures, and 12 references, 12 of which are Slavic.

SUBMITTED:

September 20, 1957

AVAILABLE:

Library of Congress

1. Betatrons-Design

Card 2/2

### "APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001860810019-7

VOROB'YEV, A.A.

AUTHOR:

Volkov, M.N., Doctor of Chemical Sciences

3-58-5-26/35

TITLE:

Intervuz Conferences on Science and Methods , Mezhvuzovskiye nauchnyye i metodicheskiye konferentsii) Electronic Accelera-

tors (elektronnyye uskoriteli)

PERIODICAL:

Vestnik Vysshey Shkoly, 1958, Nr 5, page 80 (USSR)

ABSTRACT:

The Nauchno-tekhnicheskiy sovet Ministerstva vysshego obrazovaniya SSSR (Scientific-Technical Council of the USSR Ministry of Higher Education) decided to convene in february 1958 in Tomsk an Intervuz Conference on Electronic Accelerators. Among the delegates were workers of important scientific institutions - the Mezhdunarodnyy ob"yedinennyy institut yadernykh issledovaniy (International Institute of Joint Nuclear Research), Fizicheskiy institut AN SSSR (Physics Institute of the USSR Academy of Sciences), Institut metallurgii AN SSSR (Institute of Metallurgy of the AS USSR Academy of Sciences), Institut biologicheskoy fiziki AN SSSR (Institute of Biological Physics of the AS USSR), Institut eksperimental noy patologii i terapii raka AMN SSSR (Institute of Experimental Pathology and Therapy of Cancer, USSR Academy of Medical Sciences), Leningradskiy fiziko-tekhnicheskiy in-

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3-58-5-26/35

Intervuz Conferences on Science and Methods.

Electronic Accelerators

stitut AN SSSR (Leningrad Physico-Technical Institute of the AS USSR), and others. In the Section for Using Electronic Accelerators in Industry, Physics, Medicine and Biology, and in the Theoretical Section, the betatrons issued by the Tomskiy politekhnicheskiy institut (Tomsk Polytechnical Institute) were mentioned as being widely used in detecting of defects in metals, studying the reaction of charged particles on substance, and in medical treatment. The reports of workers of the Tomskiy meditsinskiy institut (Tomsk Medical Institute) Professor I.V. Toroptsev, Dotsent N.V. Sokolova and others on the diseases of animals caused by the radiation of betatrons of 10 and 15 Mev were heard with great interest. In the Theoretical Section, Professor A.A. Vorob'yev delivered a report on a new method of accelerating electrons to very high energies. This method is based on using running waves in closed wave guides. In conclusion the conference indicated ways for a wider use of betatrons in different branches of science and technique and for an improvement in their structure. Library of Congress

AVAILABLE: Card 2/2

SOV/139-58-5-31/35

AUTHOR: Vorob'yev, A. A.

TITLE: The Effect of Deformation on the Absorption Spectra in Crystals (Vliyaniye deformatsii na spektry pogloshcheniya v kristallakh)

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, fizika, 1958, Nr 5, pp 144-152 (USSR)

ABSTRACT: The paper was presented at the Conierence of Higher Education Establishments at Tomsk, February 1958, on Dielectrics and Semiconductors. The change of distribution of particles in a crystal which occurs as a result of elastic or plastic deformation and accompanied by an increase in the lattice energy alters the energy spectrum of the crystal and consequently its absorption spectrum. Since the latent energy of deformation depends on the crystal structure there ought to be a relationship between this energy and the absorption spectra. The author discusses previous investigations (Refs.2-15) of this correlation between deformation and absorption spectra, carried out on alkali -halides, silicon, germanium, etc. Some of the results of Refs.2-15 are reproduced in Figs.1-7.

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SOV/139-58-5-31/35

The Effect of Deformation on the Absorption Spectra in Crystals

The results are summarised in a table on pp 150-151 and the following conclusions are made. The observed displacement towards longer wavelengths of the short-wavelength edge and tail of the absorption curve in the infra-red region is due to lattice defects and electron transitions caused by plastic deformation in crystals. The displacement of the F-band absorption maximum towards longer wavelengths is also due to lattice defects and electron transitions caused by plastic deformation of crystals. The displacement of the F-band absorption maximum towards short wavelengths, which occurs on uniform (omni-directional) plastic deformation agrees with the theoretical prediction obtained from the increase of energy of interaction between ions on uniform compression of the crystal. The unsystematic nature of the correlation between the ultra-violet spectra and deformation does not yield any clear conclusions about the effect of deformation on ultraviolet absorption. Acknowledgements are made to Prof. Dr. M. A. Bol'shanina and Docent V. A. Zhdanov for their advice.

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SOV/139-58-5-31/35

The Effect of Deformation on the Absorption Spectra in Crystals

There are 7 figures, 1 table and 15 references; 5 of the
references are Soviet, 5 English, 3 Japanese and 2 German.

ASSOCIATION: Tomskiy politekhnicheskiy institut imeni S. M. Kirova (Tomsk Polytechnical Institute imeni S. M. Kirov.

SUBMITTED: March 3, 1958.

Card 3/3

SOV/139-58-5-33/35

AUTHOR: Vorob'yev, A. A.

TITIE: Accelerator Equipment of the Dept. of Sciences of Paris
University (Uskoritel'nyye ustanovki fakul'teta nauk Parizhskogo
universiteta)

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, fizika, 1958, Nr 5, pp 159-163 (USSR)

ABSTRACT: This is a report of a visit to the Paris University accelerator laboratory at Orsay ("Orsi"), about 25 km from Paris and near the Nuclear Research Centre at Saclay. The laboratory is to include eventually a 1000 MeV linear accelerator, a high voltage section with a 4 MeV accelerator and a 150 MeV proton synchrocyclotron (most of the report deals with the latter instrument). The only section of the laboratory working at the time of the author's visit was the appara-

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SOV/139-58-5-33/35

Accelerator Equipment of the Dept. of Sciences of Paris University.

tus for electromagnetic separation of radioactive isotopes.

There are 2 tables.

ASSOCIATION: Tomskiy politekhnicheskiy institut imeni S. M. Kirova. (Tomsk Polytechnical Institute imeni S. M. Kirov.

SUBMITTED: March 27, 1958.

Card 2/2

AUTHOR: Vorob'yev, A.A., Professor

3-58-6-30/34

TITLE:

In the Physics Laboratories of Italian Universities (V fizicheskikh laboratoriyakh ital yanskikh universitetov)

PERIODICAL:

Vestnik Vysshey Shkoly, 1958, Nr 6, pp 89 - 90 (USSR)

ABSTRACT:

In September 1957 the World Congress of Physicists took place in Italy and examined the results of studies on unindentified particles and mesons. It was attended by most of the outstanding physicists-theoreticians of the world. The Soviet delegation consisted of Professor A.I. Alikhanov, V.S. Barashenkov, A.M. Baldin, A.A. Vorob'yev, D.D. Ivanenko, S.M. Korenchenko, S.Ya. Nikitin, I.S. Gurevich, B.P. Nikol'skiy and M.Ye. Seleznev. This delegation delivered 20 reports to the congress. The greatest interest was aroused by information on the theoretical work of Academician N.N. Bogolyubov "Dispersion Relations for Weak Interactions". After the conclusion of the congress, the Soviet scientisits visited many scientific institutions. A part of the delegation also called on the European Center of Scientific Research at Geneva.

ASSOCIATION:

Tomskiy politekhnicheskiy institut imeni S.M. Kirova (Tomsk

Polytechnical Institute imeni S.M. Kirov)

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SOV/139-58-6-27/29

AUTHOR: Vorob'yev, A. A.

TITLE: The 2.5 MeV Microtron at the Institute of Physics of

the Naples University (Mikrotron na 2.5 MeV instituta

fiziki Neapolitanskogo universiteta)

PERIODICAL: Izvestiya Vysshikh Uchebnykh Zavedeniy, Fizika, 1958, Nr 6, pp 167-170 (USSR)

ABSTRACT: Professor E. Kayanello (Caianello), Director of the Institute of Physics and Professor F. Porreka (Porreca) invited the author to visit the Institutes of Theoretical and Applied Physics of the Naples University. Professor Caianello is in charge of the Institute of Theoretical Physics where work is going on on the theory of gravitational, meson and electromagnetic fields,

electronic computers, etc. The present paper describes the 2.5 MeV microtron at the Institute of Theoretical Physics constructed under the direction of Professor A. Karrelli (Carrelli) and Professor Porreca. There are

eight figures.

ASSOCIATION: Tomskiy politekhnicheskiy institut imeni S.M.Kirova (Tomsk Polytechnical Institute imeni S. M. Kirov)

SUBMITTED: March 27, 1958

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SOV/144-58-9-1/18

Vorob'yev, A. A., Doeber of Physico-Mathematical Sciences, Professor, Director, and Moskalev, V. A., Candidate of Technical Sciences, Docent. AUTHORS:

Formation of a Beam of Rays from a Betatron TTTLE:

(Formirovaniye puchka luchey betatrona)

PERIODICAL: Izvestiya Vysshikh Uchebnykh Zavedeniy, Elektromekhanika,

1958, Nr 9, pp 3-5 (USSR)

Using the available data on the distribution of ABSTRACT:

 $\gamma$ -radiation from a 10 MeV betatron, the authors constructed a collimator which had to satisfy certain requirements. Distribution of radiation in the  $\gamma$ -ray beam from the 10 MeV betatron is shown in Fig 1, where l is the theoretical curve and 2 is the curve obtained experimentally. The authors calculated the thickness of a lead collimator which was necessary to limit the radiation intensity outside the beam to 0.05% of the intensity on the beam axis. This calculated thickness was found to be 15.5 cm and the actual collimator made by the authors had a thickness of 17 cm. The construction

of the collimator is shown in Fig 2. The collimator

Card 1/3 was placed between the coils of the accelerator electro-

Formation of a Beam of Rays from a Betatron SOV/144-58-9-1/18

magnet. The collimator could be adjusted to make the beam and the collimator axes coincide. The cross-section of the collimated beam could be altered by using interchangeable collars (bushings), shown in Fig 2. A copper filter of conical form was used to make the intensity of γ-radiation uniform across the collimated beam. Fig 3 shows the calculated (curve 1) and experimentally adjusted (curves 2,3) profiles of the copper filter used. Fig 4 shows the distribution of radiation across the collimated beam obtained both without (curve 1) and with the copper filter (curve 2). A small displacement (3-4 mm) of the collimator axis with respect to the beam axis causes a considerable change in the distribution of radiation across the beam (curve 3, Fig 4). The authors used the collimated beam to measure the distribution of isodoses in water. They used a special dosimeter with a thimble-type ionisation chamber whose working volume was 1 cm<sup>3</sup> and which had a thin graphite wall. The results of the dosimeter measurements are shown in Fig 5. The maximum dose was obtained at 20 mm below the water

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Formation of a Beam of Rays from a Betatron SOV/144-58-9-1/18 surface. Fig 6 gives a schematic representation of the betatron and the collimator assemblies.

There are 6 figures and 2 references, one of which is Soviet, one English.

ASSOCIATION: Tomskiy politekhnicheskiy institut (Tomsk Polytechnical Institute)

SUBMITTED: September 25, 1958

Card 3/3

SOV-3-58-9-15/36

AUTHOR:

Vorob'yev, A.A., Professor, Doctor of Technical Sciences, In-

stitute Director

TITLE:

On the Subject of Student Scholarships (Po povodu studen-

cheskikh stipendiy)

PERIODICAL:

Vestnik vysshey shkoly, 1958, Nr 9, pp 61-62 (USSR)

ABSTRACT:

The author talks of the work of the scholarship commissions. Before the introduction of the new order, all successful students of some faculties of industrial vuzes who passed the examination with a satisfactory mark were granted scholarships. The present number of "scholarship" students has decreased to 35.9% against the 44.6% in 1955/56. The scholarship commissions did not grant scholarships equally to all faculties, and the work of the commissions was not always properly organized. The author enumerates the improvements stemming from a conference which decided that students having only satisfactory examination marks should not be given scholarships. Students from industry and demobilized soldiers can be given grants for the 1st semester. Further scholarships are to be given to them only on equal terms with other

students. Card 1/2

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SOV/143-58-10-19/24

9(3) AUTHORS:

是这样上的技术性别的技术。在这个人的人,这个人们的心态,这个人们的特殊的人,就是这种人的一种,

Vorob'yev, A.A., Vorob'yev, G.A., Sonchik, K.K.

A Case of Lightning Strokes

TITLE:

Izvestiya vysshikh uchebnykh zavedeniy, Energetika,

PERIODICAL:

1958, Nr 10, pp 145-146 (USSR)

ABSTRACT:

A thermal thunderstorm was observed over Tomsk on June 29, 1958, at 1200 hours. Lightnings struck two poplars and a building located on the hill Voskresenskaya gora within the city. Observers saw five lightning strokes.
Two strokes hit the lightning arresters of the build-Two strokes hit two poplars which were located within the protection zone of the lightning arresters. The fifth stroke hit in a great distance of the other The authors present four photographs showing the destructions of the trees caused by lightnings. One of the poplars was hit at a height of 10 m (the total height was 16 m). There, the lightning went total height was 16 m). There, the lightning went thru a wooden box for starlings having sheet metal top and bottom. The box was split. The rind of both poplars was torn off and a large splinter destroyed

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A Case of Lightning Strokes

SOV/143-58-10-19/24

a window located at a distance of 4 m from the trees. A woman working in the kitchen noticed electrical discharges during the lightning strokes. The water and power mains and the central heating were in the immediate vicinity. A receptacle in the kitchen was destroyed. The plug at the power meters was burnt, and the telephone became defective. The authors assume that the discharges inside the building were caused by the lightning current passing thru the roots of the poplars. The authors point to the danger caused by trees in the immediate vicinity of buildings during thunderstorms. Therefore, lightning arresters are necessary. Further, it is mentioned that some people claimed to have seen a red-colored spherical lightning at a height of some ten meters, disappearing with a loud noise. There are 4 photographs.

Card 2/2

VOROB'TEV, A.A., prof., doktor fiz.-mat. nauk; SIFAYLOV, G.A.; SHURYGINA, E.K.

Double stamping of sheet steel for obtaining a given precision of groove dimensions. lzv. vys. ucheb. zav.; mashinostr. no.10: (MIRA 12:11)

1.Tomskiy politekhnicheskiy institut. (Sheet-metal work)

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SOV/144-58-11-2/17

AUTHOR: Vorob'yev, A. A. (Professor, Dr. Technical Sciences, Director)

TITLE: Some Problems in the Construction of Cyclic Accelerators With Closed Waveguides (Nekotoryye voprosy konstruirovaniya tsiklicheskikh uskoriteley s zamknutym volnovodom)

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Elektromekhanika, 1958, Nr 11, pp 13-19 (USSR)

ABSTRACT: The possibility of propagating electro-magnetic waves in closed waveguides and of controlling their speed is demonstrated theoretically and experimentally. The theory of steady motion of particles in a closed waveguide with cyclic acceleration is given. A cyclic electron accelerator with closed waveguides is proposed in which the trajectory is controlled by means of the magnetic field of the co-axial waveguide and the acceleration by the electrical vector of a travelling radio wave. An accelerator with closed waveguide has the following advantages over other cyclic accelerators: the accelerated particles have greater energy increase per revolution; the acceleration time is reduced; there is a reduction in the amplitude of oscillations associated with the quantum nature of radiation; the accelerator

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# SOV/144-58-11-2/17

Some Problems in the Construction of Cyclic Accelerators with Closed Waveguides

is smaller; it is possible to construct the accelerator with soft and hard focussing. In a closed waveguide the length of the mean equilibrium orbit is small and, therefore, damping is small. It is, therefore, possible to excite the ing is small. It is, therefore, possible to excite the ing is small. It is, therefore, possible to excite the ing is small in the waveguide at a distance that locating the exciters in the waveguide at a distance that is a multiple of a quarter wavelength. The difficult problem is a multiple of a quarter wavelength. The difficult problem of phasing in a large number of generators does not arise. Of phasing in a large number of generators does not arise. The ionosphere has waveguide properties including dispersion. The results of observation on the propagation of radio waves around the earth is in agreement with the data given here about the movement of travelling waves in closed waveguides. It is proposed to use the electric field of radio waves it is proposed to use the electric field of radio waves. The circulating round the earth to accelerate electrons. The criculating round the earth to accelerate electrons. The article opens with a review of developments in the theory and practice of electron accelerators in the last 30 years. The problem of getting better performance from cyclic accelerators is discussed. Previous work on the propagation of electromagnetic waves in closed waveguides and on the motion of electrons in an accelerator with a closed waveguide is

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Some Problems in the Construction of Cyclic Accelerators with Closed Waveguides

reviewed. Possible types of cyclic waveguide accelerators are considered. There is I table and there are 20 Soviet references.

ASSOCIATION: Tomskiy politekhnicheskiy institut (Tomsk Polytechnical Institute)

SUBMITTED: November 12, 1958.

Card 3/3

SOV/3-58-11-32/38

AUTHORS:

BENEFIT BENEFIT ELECTRON SELECTION S

Vorob'yev, A.A., Professor, and Titov, V.N., Docent

TITLE:

This Was Done in a Vuz (Eto sdelano v vuze). The Betatrons of the Tomsk Polytechnical Institute (Betatrony Tomskogo politekhnicheskogo instituta)

PERIODICAL:

Vestnik vysshey shkoly, 1958, Nr 11, pp 80 - 81 (USSR)

ABSTRACT:

Last year, a betatron, radiating energy to a maximum of 25 Mev, was demonstrated for the first time at the "Higher School's" pavilion of the All-Union Industrial Fair. The device was designed by the Tomsk Polytechnical Institute. The first betatron, radiating energy up to 5 Mev, was started at this institute in 1947. Further work in this direction produced an economical device of versatile application. Docent V.S. Melikhov suggested an original theory of seizing the electrons while speeding up, which was experimentally Docent B.N. Rodimov examined problems of interaction of electrons in a pencil at the moment of injec-Docent V.N. Titov retion and their first revolutions. alized an electric process of injecting the electrons. The department's scientific workers Docents A.K. Potuzhnyy, V.N. Titow and M.F. Filippov worked out the economic technology of making electromagnets for betatrons. In 1956, the Can-

Card 1/2

SOV/3-58-11-32/38

This Was Done in a Vuz. The Betatrons of the Tomsk Polytechnical Institute

didates of Technical Sciences B.A. Kononov and L.A. Sokolov succeeded in leading out a pencil of accelerated electrons from the betatron's chamber by two different methods. From 1948 - 1955, a series of betatrons with a maximum radiation energy of up to 15 Mev was manufactured at the Institute laboratories. From 1955 - 1958, the Institute built several betatrons with a radiation energy of up to 25 Mev. The article contains information on the recipients of these betatrons. Instructor V.I. Gorbunov developed a practical method of detecting defects in steel articles of considerable thickness by means of betatron radiation with an energy of up to 20 - 30 Mev. There are 3 photos.

ASSOCTATION: Tomskiy politekhnicheskiy institut imeni S.M. Kirova (Tomsk Polytechnical Institute imeni S.M. Kirov)

Card 2/2

NOROB'YEV, A.A.

AUTHORS:

Vorob'yev, A. A., Vorob'yev, G. A.

48-22-4-7/24

TITLE:

On Some Processes in the Electric Breakdown of Solid Dielectrics (O nekotorykh protsessakh pri elektricheskom proboye tverdykh dielektrikov)

PERIODICAL:

Izvestiya Akademii Nauk SSSR, Seriya Fizicheskaya, 1958 Vol. 22, Nr 4, pp. 392-396 (USSR)

ABSTRACT:

The authors here determined by experimental methods the dependence of the dielectric strength of the monocrystals of NaCl, KCl, KBr and KJ on the duration of the application of voltage. (reference 1) If the exposure lasts 1.10-7 sec and less an increase of dielectric strength conditioned by the discharge delay is observed. For the purpose of determining the statistical delay period in solid dielectrics breakdown the statistical delay period in solid dielectrics breakdown tests were performed on X-ray irradiated common salt. After tests were performed on x-ray irradiated common salt after the value of the dielectric strength at a respective exposure and the value of the statistical dielectric strength were and the value of development of the discharge was determined by means of a voltage oscillograph. It must be mentioned, that in the case of a noticeable discharge delay a considerably greater spreading of the values of dielectric

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On Some Processes in the Electric Breakdown of Solid Dielec- 48-22-4-7/24

strength exists as is the case with an exposition of from 3.10-7 - 6.10-6 sec (table 1). With an exposition of from 3.10-7 - 6.10-6 sec the spreading of the dielectric strength of the investigated dielectrics is conditioned by structural defects in the samples, micro-fissures, mechanical stresses and other causes. At an exposure 1,4.10-7 sec and below in isobted samples the spread due to the difference of the period of development of discharge isladded to this spreading. The diagram in figure 1 shows the dependence of the dielectric strength of KBr on the exposure. The process of breakdown in solid dielectrics can be divided into two stages, as in gaseous ones: the stage of the development of discharge and the stage of the completion of discharge. During the first stage a partial destruction of the structure of the dielectric occurs, which fact expains the occurrence of incomplete breakdown process into the stage of the loss of dielectric strength and in the stage of destruction is of relative character. The principal destruction of the solid dielectric occurs in the stage of the actual discharge. Because of the increase of the dielectric strength of solid dielectrics the probability of mechanical destruction increases with a short duration of

Card 2/3

trics

On Some Processes in the Electric Breakdown of Solid 48-22-4-7/24
Dielectrics

exposition. There are 2 figures, 2 tables, and 6 references,

3 of which are Soviet.

ASSOCIATION: Tomskiy politekhnicheskiy institut im. S. M. Kirova (Tomsk

Polytechnical Institute imeni S. M. Kirov)

AVAILABLE: Library of Congress

1. Single crystals--Dielectric properties 2. Voltage--Appli-

cations 3. Dielectrics--Test methods

Card 3/3

### "APPROVED FOR RELEASE: 03/14/2001

### CIA-RDP86-00513R001860810019-7

VOROB'YEV, A.A.

AUTHORS:

Vorob'yev, A. A., Vorob'yev, G. A.

48-22-4-8/24

TITLE:

Investigation of the Electric Breakdown of Rock Sult Containing Color Centres (Issledovaniye elektricheskogo proboya kamennoy soli, soderzhashchey tsentry okraski)

PERIODICAL:

Izvestiya Akademii Nauk SSSR, Seriya Fizicheskaya, 1958, Vol. 22, Nr 4, pp. 397-400 (USSR)

ABSTRACT:

The influence of color centres representing sources of weakly bound electrons on the dielectric strength of alkali-halogen salt crystals was repeatedly investigated (table 1). The authors determined the dependence of electric strength of colored and uncolored crystals of rock salt on the period of posure to voltage. The coloring of the crystals was produced by means of an X-ray irradiation (150 kV, 10 mA) at an exposure of 4 hours duration. The colored samples were subjected to breakdown partly in brilliant light and partly in darkness. The results are shown in the figure. The values of dielectric strength are referred to the probability of breakdown of 0 = 90%. Experiments were also conducted concerning the breakdown of colored and uncolored crystals of rock salt in an inhomogeneous field with an exposure of about 10-6 sec.

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Investigation of the Electric Breakdown of Rock Salt Containing Color Centres

48-22-4-8/24

In order to exclude the influence of discharges in the surrounding medium, the samples were equipped with conical depressions. Table 2 shows the results of the investigations and, for the sake of comparison, also the values of breakdown in the homogeneous field. If the polarity of the tip is negative, different directions of discharge occur (table 3). The modification of the discharge directions in X-ray irradiated samples is apparently conditioned by the effect of the photoelectrons on the space charge around the tip. Summary: The values of dielectric strength are lower in colored crystals than in uncolored ones at an exposure to voltage of 4.10" sec and above. If the exposition is from 2 - 3.10-8 sec., about equal values of dielectric strength are obtained. The period of development of the breakdown of colored crystals at an exposition exceeding 10-7 sec amounts to about 6,8.10-8 sec. The photoelectrons in colored crystals modify the discharge direction at a positive polarity. There are 1 figure, 3 tables, and 7 references, 5 of which are Soviet.

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### "APPROVED FOR RELEASE: 03/14/2001

CIA-RDP86-00513R001860810019-7

Investigation of the Electric Breakdown of Rock Salt Containing Color Centres

48-22-4-8/24

ASSOCIATION:

Tomskiy politekhnicheskiy institut im. S. M. Kirova (Tomsk Polytechnical Institute imeni S. M. Kirov)

AVAILABLE:

Library of Congress

2. Dielectrics--Determination 1. Crystals--Dielectric properties

3. Crystals--Colorimetric analysis

SOV/57-28-10-11/40 24(6) Woroblyev, A. A., Hakhodnova, A. P. AUTHORS:

High-Frequency Dielectric Losses and the Lattice Energy in Compounds of Second Group Metals (Dielektricheskiye poteri TITLE:

na vysokoy chastote i energiya reshetki dlya soyedineniy

metallov vtoroy gruppy)

Zhurnal tekhnicheskoy fiziki, Vol 28, Kr 10, PERIODICAL:

pp 2173 - 2174 (USSR)

This paper gives an account of the investigation of the temperature and frequency dependence of the tg \$ ABSTRACT:

(loss angle) of sintered polycrystalline samples of oxides, fluorides and chlorides of second group metals. BeO, MgO, CaO, SrO, and BaO were investigated in a temperature range of 25+480°C, Ca-, Sr-, Bafluorides and Ca-, Sr-, Ba-chlorides in a temperature range of 25 to 260°C. The samples were produced from chemically pure substances. The density of the samples

amounted to 65-70% and 95%, respectively, of the density of the monocrystals, tg & decreases in all poly-

crystalline sintered samples of all compounds in the

Card 1/3

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High-Frequency Dielectric Losses and the Lattice Energy SOV/57-28-10-11/40 in Compounds of Second Group Metals

total range of frequencies and temperatures employed with an increase of the lattice energy. The growth of the cation radius under otherwise equal conditions is accompanied by a relaxation of the lattice and by a modification of the tg Swhich proceeds according to certain regularities. The variation of the to in halide compounds of alkaline earth metals corresponds to the fundamental physical and chemical properties of the substance in porous and in dense samples. It is determined by the energy of the thermochemical interaction of the ions of the crystal lattice. The information gained in the investigation of the frequency dependence of the dielectric losses in the oxides and halide compounds of the elements of the second group indicates that in the range of 450 to 900 kc the losses are reduced, when the frequency rises. The alelectric losses in porous polycrystalline samples of compounds of the second group of elements in air are considerably in excess of those in vacuum. In samples prepared of chemically pure substances the tg & varies as the cation dimensions, the

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High-Frequency Dielectric Losses and the Lattice Energy SOV/57-28-10-11/40 in Compounds of Second Group Metals

polarizability and inversely as the point of fusion of the substance. The smaller the energy of the crystal lattice the higher will be the losses at a given temperature and frequency. G.V.Krivoshchekov, Candidate of Technical Sciences, assisted with the work. There are 2 figures.

SUBMITTED:

November 4, 1957

Card 3/3

24(6) AUTHORS:

Vorob'yev, A. A., Nakhodnova, A. P.

507/57-28-10-14/40

TITLE:

Electric Conductivity and Lattice Energy of Compounds of the Metals of the Second Group of D.I.Mondeleyev's System (Elektroprovodnost' i energiya reshetki soyedineniy metallov vtoroy gruppy sistemy D.I.Mendeleyeva)

PERIODICAL:

Zhurnal tekhnicheskoy fiziki, Vol 28, Nr 10,

pp 2192 - 2193 (USSR)

ABSTRACT:

This paper gives an account of the study of the problem, whether the laws derived for monocrystals are applicable also to polycrystalline bodies used in engineering. The temperature dependence of the electric conductivity of oxides and halide compounds of the second group elements in the temperature range of 250 to 900°C was measured. The polycrystalline samples were prepared by pressing and subsequent baking in the air. The measurements were carried out in vacuum with direct current in weak fields (2.5 to 75 V/cm) at a pressure of p = 10<sup>-5</sup>mm of mercury column. Platin electrodes were evaporated onto

the samples. It appears that at high temperatures the

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Electric Conductivity and Lattice Energy of Compounds SOV/57-28-10-14/40 of the Metals of the Second Group of D.I. Mendeleyev's System

electric conductivity of sintered oxides of second group metals decreases with an increase of the lattice energy, whereas the activation energy increases. Identical phenomena were also observed with other compounds. The specific electric conductivity of the second group metal oxides, of the calcium-, strontium-, and barium fluorides, and of the calcium-, strontium-, and barium chlorides varies as the atomic volume of the metal, the polarizability of the cation, the decrease of the point of fusion of the compound, the dissociation energy and the magnitude of the isobaric potential. Hence the most simple compounds of the second group elements exhibit, besides the modification of the principal thermochemical features, a variation of the specific electric conductivity, which is governed by definite rules. In the range of low temperatures the activation energy of all compounds is considerably deficient of that in the range of high temperatures and lies within the limits of 0.15 to 0.58 eV. The variation of the specific conductivity and of the activation energy in

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Electric Conductivity and Lattice Energy of Compounds SOV/57-28-10-14/40 of the Metals of the Second Group of D.I. Mendeleyev's System

the range of relatively small temperatures does not show a course which is distinctively governed by definite rules. Hence the activation energy and the specific conductivity in the range of high temperatures are determined by the binding energy of the ions in the lattice and can be used as a characteristic feature of the electrophysical properties of the substances. G.V. Krivoshchekov, Candidate of Technical Sciences, assisted with the work. There are 2 figures.

SUBMITTED:

November 4, 1957

Card 3/3

sov/58-59-9-20517

Translation from: Referativnyy Zhurnal Fizika, 1959, Nr 9, p 147 (USSR)

AUTHOR:

Vorob'yev, A.A.

titles.

TITLE:

Experimental Regularities in Electronic Processes in Ionic Crystals:

A Need for Theoretical Generalization

PERIODICAL:

Izv- Tomskovo politekhn. in-ta, 1958, Vol 94, pp 3-15

ABSTRACT:

The author describes experimental data indicating a connection between electronic and ionic processes. He holds that, when elaborating a theory of electronic phenomena in the ionic crystal and, in particular, when working out the kinetic equations for the electrons in the crystal to make allowance for the role of the medium, it is necessary to introduce terms describing the coupling between the energy of the electronic processes and the energy of the lattice. The bibliography contains 25

M.N. Treskina

Card 1/1

SOV/58-59-9-20518

Translation from: Referativnyy Zhurnal Fizika, 1959, Nr 9, p 147 (USSR)

AUTHORS: Astafurov, A.V., Vorob'yev, A.A., Vorob'yev, G.A., Kevroleva, K.M.

TITLE: The Volt-Second Characteristics of Solid Homogeneous Dielectrics

PERIODICAL: Izv. Tomskovo pilitekhn. in-ta, 1958, Vol 94, pp 16 - 19

ABSTRACT: The authors measured the volt-second characteristics at sparkover in the homogeneous and inhomogeneous (one electrode being in the form of a point)

field of a great number of solid dielectrics; single crystals of NaCl, KCl, KBr and KJ, single crystals of Seignette's salt, ice, foliated talc containing water of crystallization, porcelain and others. For the sparking voltage a value was selected at which sparkover occurred with a probability of 90%. In the case of all the dielectrics investigated, when samples having a thickness of 0.15 mm were exposed for  $1 \cdot 10^{-7}$  sec or less, an in-

crease in electric resistance was observed. The rise in sparking voltage under short exposures is caused by discharge delay. It is well-known (cf. RZhFiz, 1959, Nr 1, 1174) that, in the case of exposures shorter than (2 · 3)· 10<sup>-0</sup> sec, the time delay is actually the time of forming the discharge

Card 1/2 tf tf was ascertained from the voltage oscillogram. The average velocity

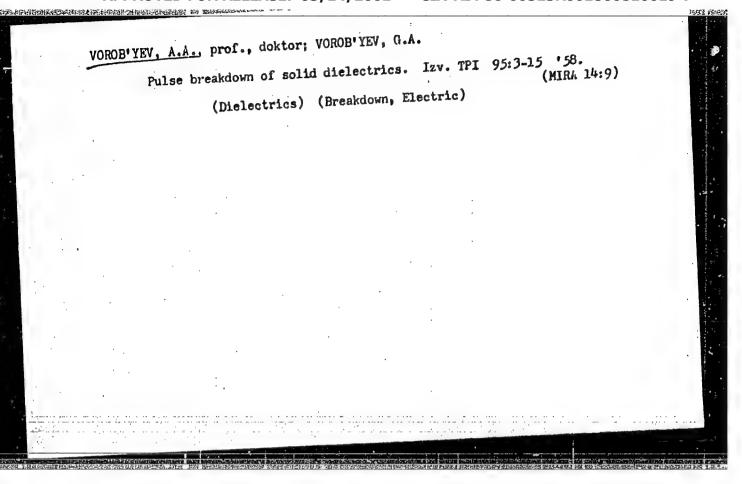
SOV/58-59-9-20518

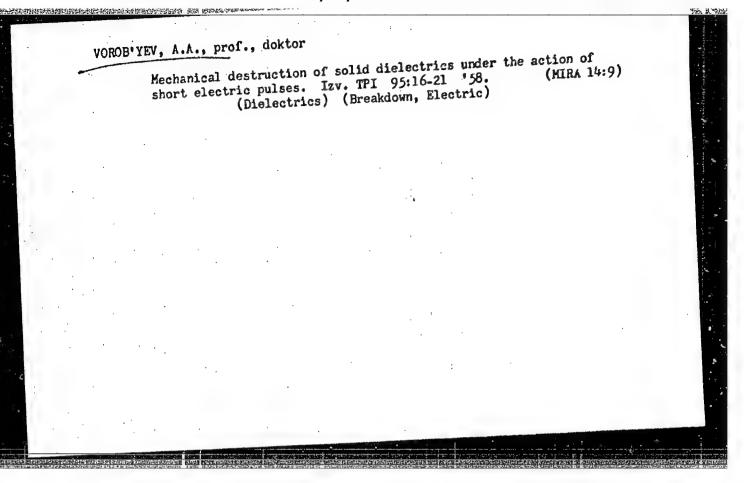
The Volt-Second Characteristics of Solid Homogeneous Dielectrics

of the propagation of the discharge was determined from the values of  $t_f$  and the thickness of the samples. The following conclusions were drawn: 1) for solid homogeneous dielectrics with high electric resistance ( $\sim 10^6$  V/cm),  $v_{av}$  is of the order of  $10^0$  cm/sec; 2) in the case of a homogeneous field, the value of  $v_{av}$  is several times greater for thick samples (0.5 to 1.5 cm) than for thin samples (0.15 to 0.3 mm); 3)  $v_{av}$  is significantly greater for the positive than for the negative polarity of the point; and 4)  $v_{av}$  increases with an increase in overvoltage.

Yu.S.K.

Card 2/2





### "APPROVED FOR RELEASE: 03/14/2001 CIA

CIA-RDP86-00513R001860810019-7

VOROB'YEV, A.A., prof., doktor

Application of electric discharges in dielectrics in blasting operations. Izv. TPI 95:22-25 '58.

(Blasting) (Electric discharges) (Dielectrics)

(Blasting) (Electric discharges) (Dielectrics)

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sov/112-60-1-1158

Translation from: Referativnyy zhurnal Elektrotekhnika, 1960, Nr 1, p 15

(USSR)

AUTHORS:

Vorob'yev, A.A., Dmitriyevskiy, V.S. Methods and Devices for Equalizing the Voltage Distribution Over

the Surface of a Solid Dielectric on Pulses TITLE:

Izv. Tomskogo politekhn. in-ta, 1958, Nr 95, pp 45 - 49

PERIODICAL:

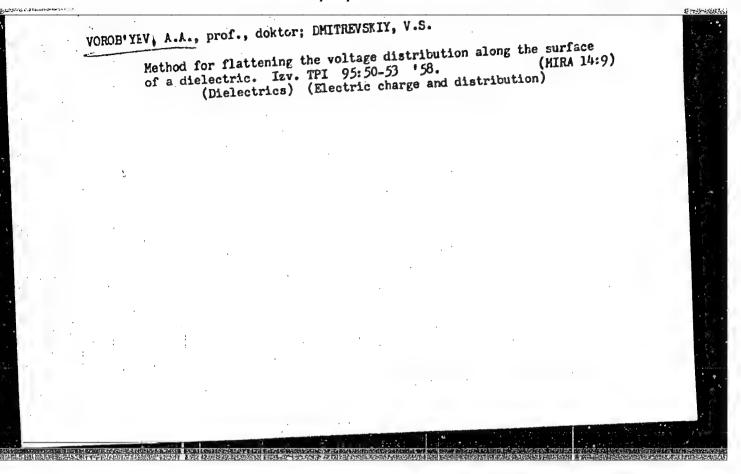
ABSTRACT:

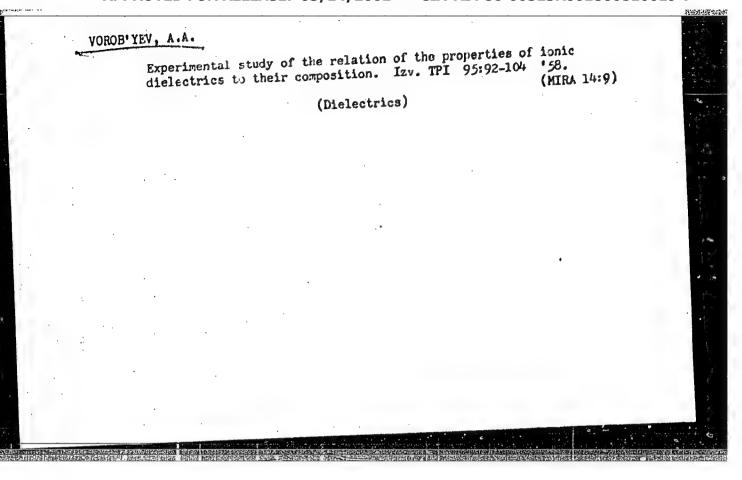
General conditions applied to devices equalizing the voltage distribution over the surface of a dielectric and the methods

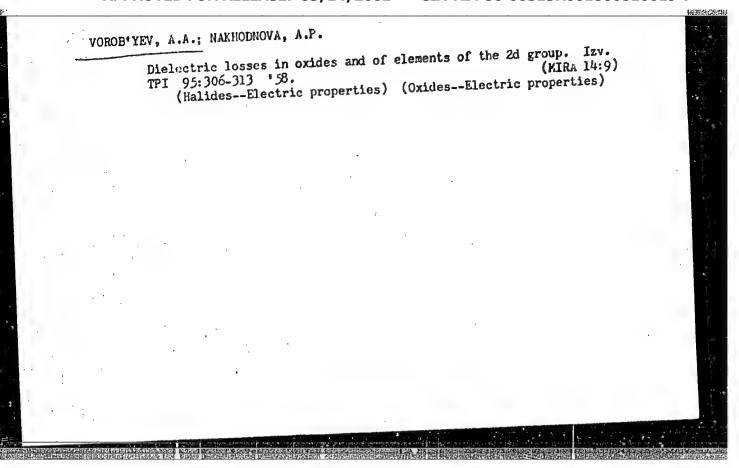
of equalizing are discussed. Semiconducting coatings of dielectric surface, rings and screens of electrodes of long insulator chains do not secure a uniform voltage distribution over the surface on pulses. The VEE method of equalization is applicable at a positive pulse polarity. Considering the

above methods inadequate for the cases of pulse voltages, the

Card 1/2







30V/112-60-1-1156 Translation from: Referativnyy zhurnal Elektrotekhnika, 1960, Nr 1, p 15 15.2210 5.4100 (USSR) Vorob'yev, A.A., Nakhodnova, A.P. Electroconductivity of Oxides and Haloid Compounds of the II AUTHORS: Group Elements TITLE: Izv. Tomskogo politekhn. in-ta, 1958, Nr 95, pp 325 - 330 The study of specific conductivity 6 was carried out on caked PERIODICAL: polycrystalline disks 10 mm in diameter and 0.35 - 0.8 mm thick.

The relative density of samples was 65 - 75%. The samples were ABSTRACT: ground and platinized. Measurement of temperature dependence of 6 was carried out by the residual current at 10-5 mm Hg. In the weak field region (E = 2.5 - 75 v/cm) 6 of the compounds under study increases with an increase of E. With an increase in the density of samples O increases. For a given temperature, Card 1/2

SOV/112-60-1-1156

Electroconductivity of Oxides and Haloid Compounds of the II Group Elements

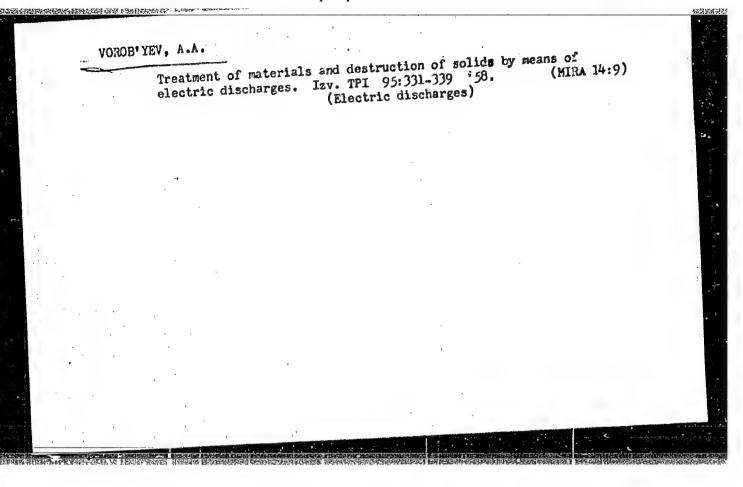
of oxides and haloid compounds increases with a decrease in the energy of the crystalline lattice. The activation energy of charge carriers decreases with a decrease in the energy of the crystalline lattice. 9 references.

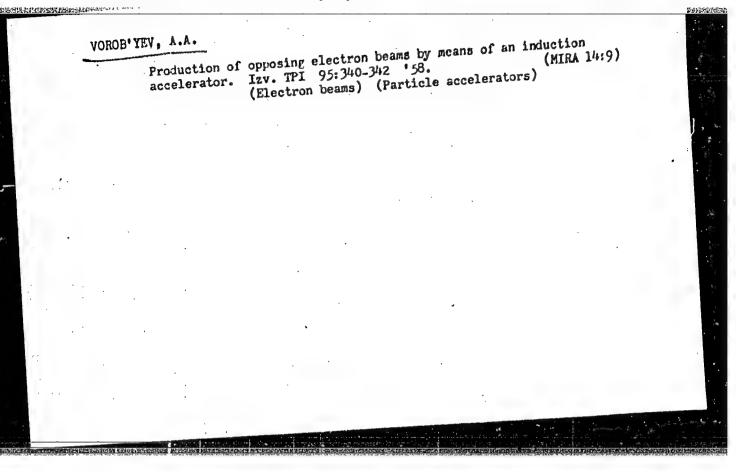
A.A.V.

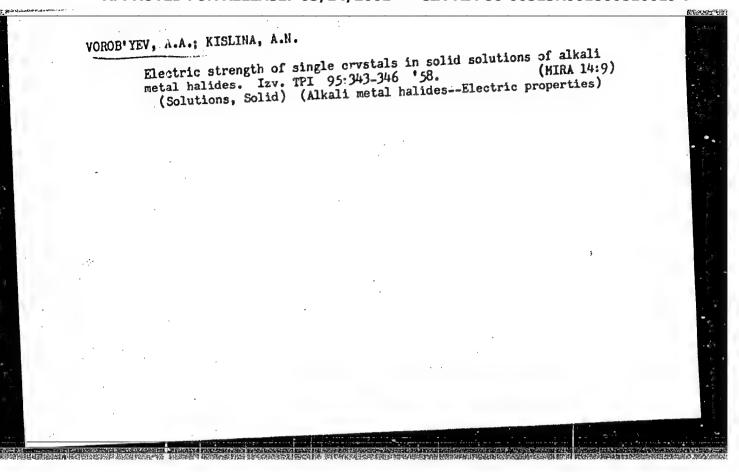
Card 2/2

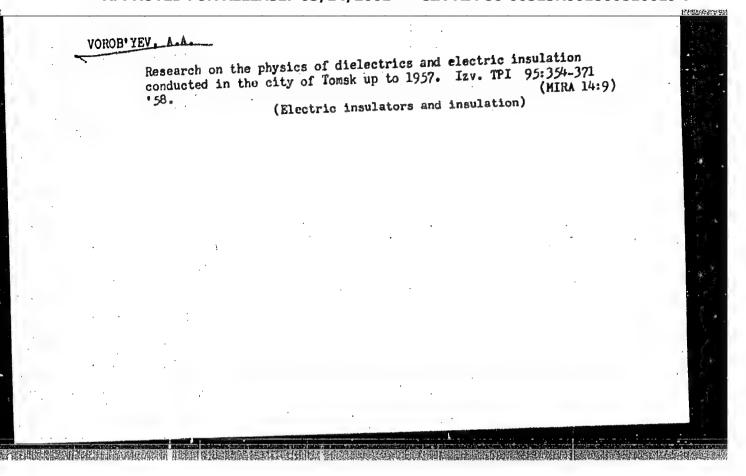
### "APPROVED FOR RELEASE: 03/14/2001

CIA-RDP86-00513R001860810019-7









# VOROB'YEV, A.A.; TERMOV, I.M. International conference on high energy particle accelerators and instruments used in nuclear physics, held in Geneva from January (MERA 13:12) lith to January 19th, 1959. 1. Moskovskiy gosudarstvennyy universitet imeni M.V. Lomonosova i Tomskiy politekhuicheskiy institut imeni S.M. Kirova. (Particle accelerators—Congresses) (Nuclear physics—Congresses)

SOV/139-59-1-17/314 21(7)

AUTHORS: Vorob'yev A.A., Moskalev V.A. Some Characteristics of Betatron Target Radiation at 10-25 MeV (Nekotoryye kharakteristiki luchey betatronov

na 10-25 Mev)

PERIIDICAL: Izvestiya Vysshikh Uchernykh Zavedeniy, Fizika, 1959, Nr 1, pp 102-106 (USSR)

ABSTRACT: Results of experiments on the spatial distribution of betatron target radiation are reported. It is shown that the experimental data are in good agreement with the theory given by Lowson (Ref 2). The measurements were carried out using a special detector (Ref 3). detector includes a thimble ionisation chamber with a working volume of 1 cm<sup>2</sup> and a graphite wall whose thickness may be varied from 3 mm to the equilibrium value. The detector could be continuously moved over a 1 m radius circle, the rotation axis of the detector passing through the target. Fig 1 shows the spatial distribution in the plane of the orbit of the radiation in the main beam at 10 MeV. Curve 2 is theoretical (Lowson) and Curve 1 was obtained from experiments. The discrepancy Card 1/2 between the theoretical graph and the experimental one (on the right hand side) is due to target edge effects

APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001860810019-7"

SOV/139-59-1-17/34

Some Characteristics of Betatron Target Radiation at 10-25 MeV,

described in Ref 4. The full width at half height of the
intensity curve is 240. The distribution in the vertical
direction (Fig 2) is the more symmetrical and its full
width at half height is 170. Fig 3 gives the spatial
distribution of betatron radiation at 10 MeV in the plane
of the equilibrium orbit. The curve has a well-defined
maximum. The spatial distribution at 25 MeV is also in
good agreement with the theory. The "effective" energy
was determined experimentally by absorbing the radiation
in copper and lead. This energy was found to be equal to
4 MeV in the case of 10 MeV betatron.

Card 2/2 There are 5 figures and 10 references, of which 2 are English and 8 Soviet.

ASSOCIATION: Tomskiy Politekhnicheskiy Institut imeni S.M. Kirova (Tomsk Polytechnical Institute imeni S.M. Kirov)

SUBMITTED: July 16, 1958

.66536

SOV/144-59-1-16/21

21,2200 AUTHORS: Ananyev, L.M., Cand. Tech. Sci., Docent; Volkov, M.N., Dr. Chem. Sci.; Vorob'yev, A.A., Dr. Physico-Mathematical Sci., Professor, Director of Tomsk Polytechnical Inst.; Titov, V.N., Cand. Tech. Sci., Docent; Filippov, M.F., Cand. Tech. Sci., Docent.

Development of Electron Accelerators at the Tomsk

Polytechnical Institute TITLE:

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Elektromekhanika, 1959, Nr 1, pp 121-124 (USSR)

ABSTRACT: Work on electron accelerators at the Tomsk Polytechnical Institute was begun in 1946. The aim was to produce an inexpensive betatron installation, simple in manufacture and operation. In spite of the fact that many scientists

and engineers maintained that the betatron must be

supplied at a highly stable voltage, the authors developed a betatron using a supply derived from the a.c.

mains. Changes in frequency and voltage had to be compensated automatically, and experiments have shown that this is possible. The fact that the betatron was

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supplied from industrial-frequency mains meant that the installation was very inexpensive. The second important

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SOV/144-59-1-16/21

Development of Electron Accelerators at the Tomsk Polytechnical Institute

contribution to betatron construction was the design and proportioning of parts of the machine and its parameters, which was done bearing in mind both technical and economical considerations. Theories were developed leading to formulae which are extremely convenient and time-saving in the adjustment of betatrons. Efforts were made to reduce the overall dimensions of betatrons. M.F. Filippov has developed a special yoke which ensures high azimuthal phase uniformity of the magnetic field. In 1946 V.N. Titov developed some very simple methods of injection and deflection. A betatron has been constructed, Working on 150 c/s, in which both half-periods of the magnetic field are used to accelerate the electrons. At the point of intersection of the beams from two targets of such a betatron the intensity is 300 roentgens per minute at one metre. V.A. Moskalev and Yu.M. Akimov developed a stereo-betatron having a common magnetic circuit with two pairs of poles and two air gaps, giving effectively two accelerating chambers. This stereo-betatron may be used in medicine for deep irradiations and in radiographic

Card 2/3

SOV/144-59-1-16/21 Development of Electron Accelerators at the Tomsk Polytechnical Instituto

> flaw-detection in order to obtain stereo-photographs. B.A. Konokov and L.S. Sokolov developed methods for the extraction of the electron beam both by deflecting the electrons by an electric field and by removing the electrons beyond the magnetic field by means of nonmagnetic channels. B.N. Rodimov and others have considered the acceleration process from the theoretical point of view. Since 1954 the Institute has been

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concerned with the development of powerful electron synchrotrons.

There are no figures, tables or references.

ASSOCIATION: Tomskiy politekhnicheskiy institut (Tomsk Polytechnical Institute)

> Dr. Volkov is a Departmental Head at the Ministry of Higher Education, SSSR. (Nachal'nik otdela MVO SSSR)

s/155/59/000/02/028/036

TITLE: Additional Absorption and Pluorescence in Activated Alkaline-

haloidal Phosphors and the Energy of the Grid Neuchnyye doklady vysshey shkoly. Fiziko-matematicheskiye nauki, PERIODICAL

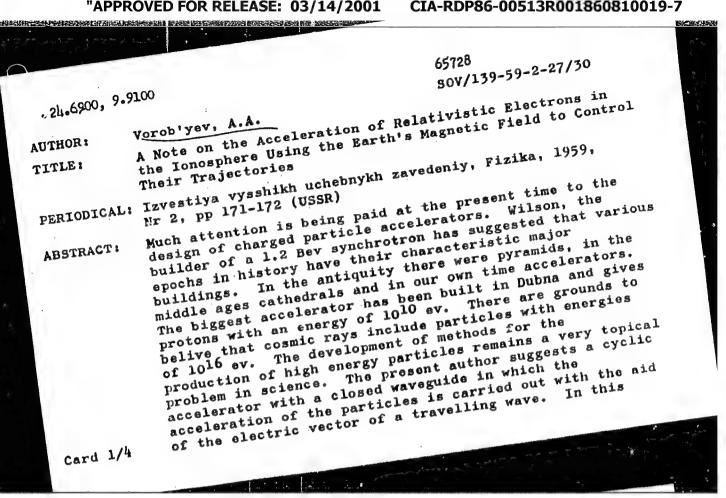
TEXT: Additional absorption bands occur after irradiation of pure alkaline-haloidal crystals with X rays. Further absorption bands arise under introduction of an activator. In the transition to connections with 8 smaller lattice energy the maximum of the corresponding absorption bands removes in the direction of longer waves. Some further statements partially already published by the author (Ref. 1) and in (Ref. 2) on the con-

There are 2 references: 1 Soviet and 1 German.

Tomskiy politekhnicheskiy institut (Tomsk Polytechnic ASSOCIATION: Institute)

February 17, 1959 SUBMITTED:

Card 1/1



65728 SOV/139-59-2-27/30 ctrons in the

A Note on the Acceleration of Relativistic Electrons in the Ionosphere Using the Earth's Magnetic Field to Control Their Trajectories

Trajectories

Trajectories

connection, the Tomsk Polytechnical Institute is studying the theory of motion of radio waves in closed waveguides. The phase velocity in a waveguide depends on the frequency. Below the critical wavelength, the phase velocity is equal to the velocity of light. Because the cross-section of the waveguide is limited, a critical wavelength and dispersion are present. the ionosphere, the phase velocity of radio waves also depends on frequency. The directed propagation of radio waves in the ionosphere can be arranged to take place with a velocity smaller than the velocity of light. The dispersion in the ionosphere takes place because radio waves produce electron vibrations and the phase velocity of electromagnetic waves in the ionosphere depends on the wavelength. Observations of propagation of radio waves around the terrestrial globe over closed paths are in agreement with the theory of travelling waves in a closed radio waveguide. At an altitude of 100 km, the concentration of neutral particles is 2.6 x 1013 and at

Card 2/4

sov/139-59-2-27/30

A Note on the Acceleration of Relativistic Electrons in the Tonosphere Using the Earth's Magnetic Field to Control Their an altitude of 200 km it is  $(5-10) \times 10^{10}$ , ie lower by Trajectories

a factor of 109 than at the earth's surface. reduction in the concentration is sufficient for the acceleration of electrons. The electron concentration at an altitude of 100 to 600 km is 105 - 1.6 x 106 electrons/cm3. It depends on the time of day, the geographical latitude, time of the year and solar geographical factouse, time of the year and solar activity. It is known that radio waves can travel round the earth to reach the transmitting station. This is known as global echo and is stable. Sometimes a double or even triple global echo is observed. It is suggested that the global echo is propagated as a grazing wave along the lower boundary of the F-layer at an altitude of 204 km, for a time of 0.1365 sec, and with a velocity of 299776 km/sec, or along a zig-zag trajectory at an altitude of 200 to 300 km. In this way, the current altitude of 200 to 300 km. In this way, the current density will be 460 amps/cm<sup>2</sup>. For electron energies of 1012 ev or more, fields of up to 20 volt/cm would be The problem of maintaining such a high intensity necessary.

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65728 SOV/139-59-2-27/30

A Note on the Acceleration of Relativistic Electrons in the Ionosphere Using the Earth's Magnetic Field to Control Their Trajectories

wave over the entire path requires a separate solution. It is suggested that this method might be superior to the recently suggested electron accelerator which involves the laying out of a tubular chamber along the earth's equator, in which the trajectories would be controlled by the earth's magnetic field.

ASSOCIATION: Tomskiy politekhnicheskiy institut imeni S.M.Kirova (Tomsk Polytechnical Institute imeni S.M.Kirov)

SUBMITTED: November 12, 1958

Card 4/4

06540 SOV/142-2-2-16/25 Vorob vev, A.A. Solntsev, B.A., and Titov, V.N. The Application of an Electrode Electric Field for 9(2,3)ÁÙTHORS: Electron Acceleration in a Synchrotron Izvestiya vysshikh uchebnykh zavedeniy, Radiotekhnika, TITLE: 1959, Vol 2, Nr 2, pp 246-247 (USSR) Coaxial cavity resonators found the most wide-spread PERIODICAL: application as electron accelerators in electron synchrotrons with annular electromagnets. They were first used by F.K. Goward and D.E. Barnes in 1946. ABSTRACT: Resonators of this type occupy a part of the pole gap Resonators of this type occupy a part of the pole gap of the electromagnet. Therefore, the outer conductor cannot have sufficiently large dimensions compared to the inner one. Further, bending of the resonator cannot be avoided. These conditions reduce the resonance not be avoided. These conditions reduce the resonance not be avoided. These conditions reduce the resonance to a considerable degree. The introduction of highto a considerable degree the resonance cavity Ref 1,
quality dielectrics into the resonance of the 2, 37 does not produce a considerable increase of the parallel resistance. In 1948, at the Tomskiy politekhnicheskiy institut imeni S.M. Kirova (Tomsk Polytekhnicheskiy institut imeni S.M. Card 1/4

SOV/142-2-2-16/25

The Application of an Electrode Electric Field for Electron Acceleration in a Synchrotron

technic Institute imeni S.M. Kirov) the suggestion was made to use for electron acceleration the electric field created in a gap between conductive coatings inside the chamber, as shown by figure 1. With a sufficient thickness of the conductive layer, the configuration of the electric field will not be difconliguration of the electric field will how be different from the shape of the field created in the accelerating gap of a coaxial resonator. In 1955, a 20 mev synchrotron was built at the Tomsk Polytechnic Institute with the application of the aforementioned electrodes. For feeding high frequency power to the accelerating gap two metal rings were used which were placed on the accelerating chamber, as shown by fig-The capacitance component of the input impedance of the device was compensated by a parallel-connected inductance, as shown by the equivalent circuit in figure 3. The aforementioned device occupies little space in the pole gap of the accelerating electromagnet and provides optimum operating conditions.

Card 2/4

SOV/142-2-2-16/25

The Application of an Electrode Electric Field for Electron Acceleration in a Synchrotron

parallel resistance of the accelerating gap may be higher than with coaxial resonators. Frequency adjustments may be easily made. Special matching and balancing systems for the coupling with the HP generator are not required. The manufacture of such an accelerating device is considerably simpler than that of other accelerators. Figure 4 shows a general view of the accelerating device in the chamber. The electromagnet of the 15 mev betatron of the Tomsk Polytechnic Institute provided the magnetic field. The accelerating device was excited by a push-pull generator, composed of metal-ceramic tubes GI-12B, producing approximately 20 watts at a frequency of 350 mc. ing approximately 20 was as a liequestry of the with such a power, 150 volts were obtained at the accelerating gap. The basic characteristics of the accelerating gap. The basic characteristics of the synchrotron with this accelerating device were the same as those obtained with a coaxial resonator. gamma radiation had an intensity of 2 roentgen at 1 m

Card 3/4

SOV/142-2-2-16/25

The Application of an Electrode Electric Field for Electron Acceleration in a Synchrotron

distance from the target. There are 2 diagrams, 1 photograph, 1 circuit diagram and 3 references, 1 of which is Soviet and 2 English.

This article was recommended by the Nauchno-issledovatel'skiy institut yadernykh issledovaniy, elektroniki i avtomatiki pri Tomskom politekhnicheskom institute imeni S.M. Kirova (Scientific Research Institute for Nuclear Research, Electronics and Automation at the Tomsk Polytechnic Institute imeni S.M. Kirov).

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July 11, 1958

Card 4/4

## "APPROVED FOR RELEASE: 03/14/2001

## CIA-RDP86-00513R001860810019-7

YOROB TEV, A.A., prof., doktor fiz.-matem.nauk; YOROB TEV, G.A.; MEL'RIKOV.

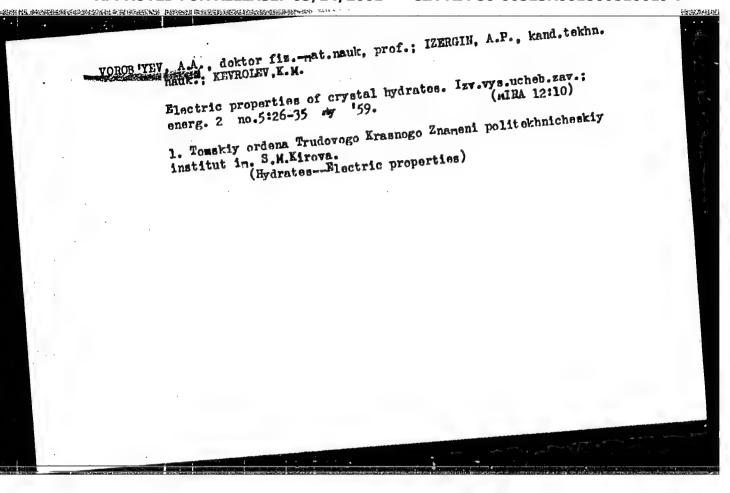
Formation of discharges in solid dielectrics. Izv. vys.ucheb.

gav.; energ. 2 no.4:35-37 Ap '59.

1. Tomskiy ordena Trudovogo Kraenogo Znameni politekhnicheskiy
institut imoni S. M. Kirova.
(Blectric discharges)

## "APPROVED FOR RELEASE: 03/14/2001

## CIA-RDP86-00513R001860810019-7



POROB'TEV. A.A., doktor fiz.-mat.nauk, prof.

Development of the theory concerning the interrelation between the properties of ionic crystals in the research of tween the properties. Izv.vys.ucheb.zzv.; energ. 2 no.6:48-54 Tomak scientists. Izv.vys.ucheb.zzv.; energ. (MIRA 13:2)

Je '59.

1. Tonskiy ordena Trudovogo Krasnogo Znameni politelhnicheskiy institut imeni S.M.Kirova. Predstavlena kafedroy teknniki vysokikh napryazheniy.

(lonic crystals)

VOROBITEV. A.A., doktor fiz. mat. nauk prof.; KISLINA, A.N., kand. tekhn.

Flectric strength and microhardness of crystals of solid solutions which break down in the of the systems; process of crystal growing from the melt. Izv. vys. unheb. sav.; energ. 2 no.7:41-42 Jl 159.

1.Tomskiy ordena Trudovogo Krasnogo politekhnicheskiy institut im. S.M. Kirova. (Alkali metal halide orystals)

VOROBITEY A.A., doktor fix.-mat.nauk nauk prof.; IVANKINA, M.S.;

KISLINA, A.N., kand.tekhn.nauk; SAVINTSEV, P.A., kand.fix.mat.mauk dots.

Physical and chemical properties of insulating crystals. Izv.

Physical and chemical properties of insulating crystals. Izv.

159.

(MIRA 13:2)

1. Tomskiy ordena Trudovogo Krasnogo Znameni politekhnicheskiy institut imeni S.M.Kirova.

(Alkali metal halide crystals--Electric properties)

CHERT PERSON REPORTED AND SERVED ASSESSED. 66308 SOV/143-59-4-6/20 Vorobyev, A.A., Doctor of Physico-Mathematical Sciences, Frofessor; Vorobiyev, G.A., and Melinikov, M.A. Formation of Discharge in Solid Dielectrics AUTHORS: Izvestiya vysshikh uchebnykh zavedeniy - Energetika, The article deals with the dependency of the electric puncture strength on the duration of the effect of the voltage in alkaline salts (NaCl, KCl, KBr and KJ), the voltage in alkaline salts (NaCl, metanical TITLE: 1959, Nr 4, pp 35-37 (USSR) PERIODICAL: halite, muscovite, and some synthetic materials used nailte, muscovite, and some synthetic materials used for insulation purposes (styroflex, polystyrene, teffor insulation purposes (styroflex, polystyrene, teffor, and plexiglass). The duration of the effect of the voltage was between 10-6 and 10-9 sec. The resulting the test is given in tables. ABSTRACT: The result of the test is given in tables and graphs. found that the electric puncture strength decreased with the duration of the effect of the voltage up to a certain point and then either started to rise again to a small extent (halite) or remained constant (synthetic materials, muscovite). The monocrystals of the alkaline salts showed a constant fall of the electric Card 1/2

SOV/143-59-4-6/20

Formation of Discharge in Solid Dielectrics

puncture strength, if the effect of the voltage was extended. The authors explain this phenomenon with formation processes in the dielectric and supply a physical explanation of its mechanism. There are 2 graphs, 2 tables and 4 Soviet references.

ASSOCIATION: Tomskiy ordena Trudovogo Krasnovogo Znameni politekhnicheskiy institut imeni S.M. Kirova (Tomsk Polytechnical Institute of the Order of the "Red Banner of Labor" imeni S.M. Kirov)

Card 2/2

Vorob'yev, A.A., Vorob'yev, G.A., Mesyats, G.A. and sov/109-4-8-5/35 Pulse and Oscillographic Techniques for the Measurement Sonchik, K.K. AUTHORS: Radiotekhnika i elektronika, 1959, Vol. 4, Nr. 8, of Discharge Lags in Dielectrics The discharge lags in dielectrics, subjected to action The discharge lags invalence trics, subjected to action of rectangular voltage pulses, can be determined by using the circuit of Figure 1. In this, the capacitances TITLE: pp 1257 - 1259 (USSR) PERIODICAL: A voltage pulse is thus produced across the ABSTRACT: this can be used for the investigation and C2 The voltage pulse appearing at the capacitance Cn, which is connected in parallel with triggered. the vertical plates of the oscillograph, is used as the resistance time base. In this manner, a synchronism is achieved of dielectrics. between the investigated phenomenon and the time base so that the pulse always appears at the same spot of the Cardl/3

sov/109-4-8-5/35

Pulse and Oscillographic Techniques for the Measurement of Discharge

screen. The resistances  $R_2$ ,  $R_2^i$  and  $R_g$ Lags in Dielectrics capacitance Cn can be determined from the condition of the required writing speed for the tube. The deficiency of the circuit lies in the absence of a horizontal portion in the time base preceding the leading edge of the pulse. The circuit of Figure 1 can produce pulses having a rise time of 3 x 10 sec. If it is necessary to obtain faster pulses, having amplitudes of the order of 20 kV, a different technique is used. A suitable pulse generator, which can give rise times of the order of 10-9 sec is illustrated in Figure 2. In this, the resistances R<sub>1</sub>, R<sub>2</sub>, ..., R<sub>n</sub> divide the voltages over the switching gaps  $P_1$ ,  $P_2$ , ...,  $P_n$ . When the gap  $P_1$ discharges the capacitance  $C_1$ , a larger voltage is applied to the gap  $P_2$ , which is rapidly broken down. P, receives the highest over-voltage. The last gap,

Card2/3

SOV/109-4-8-5/35
Pulse and Oscillographic Techniques for the Measurement of Discharge Lags in Dielectrics

The rise time of the pulse produced by the circuit of Figure 2 is plotted in Figure 4 as a function of the over-voltage. An application of the circuit of Figure 2 over-voltage. An application of the circuit of Figure 2 is illustrated in Figure 5; the system is employed for discharging several circuits having different voltages. There are 5 figures and 3 references, of which 1 is Soviet, 1 German and 1 English.

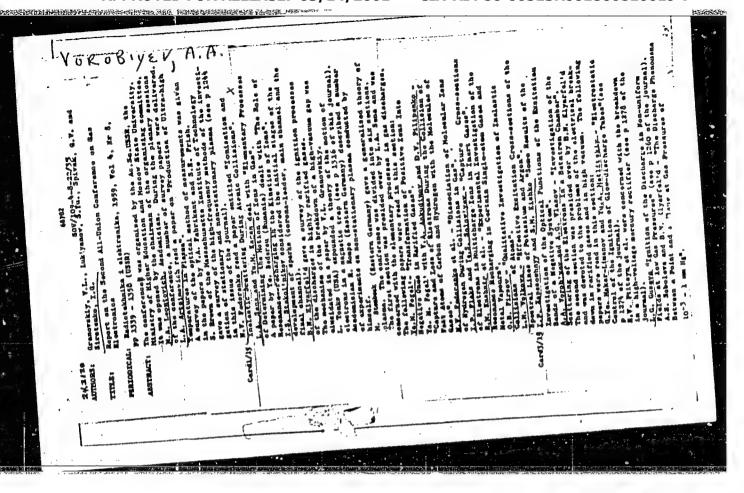
March 5, 1959 SUBMITTED:

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66306 sov/143-59-5-4/19 Vorob'yev, A.A., Doctor of Physical and Mathematical Sciences, Professor, and Tranging, A.P., Candidate of 24(3) Technical Sciences, and Kevroleva, K. M. AUTHORS: Electrical Properties of Crystal Hydrates Izvestiya vysshikh uchebnykh zavedeniy - Energetika, TITLE: 1959, Nr 5, pp 26-34 (USSR) The authors review the research work conducted in the PERIODICAL: field of electrical properties of crystal hydrates at Tomsk vuzes. The specific inductive capacitance at Tomsk vuzes. The specific inductive capacivants and the dielectric loss angle were discussed in this paper, as well as the electrical strength of crystleman and the electric loss and the electrical strength of crystleman and c ABSTRACT: hydrates. The investigations were conducted in wide ranges of temperatures and frequencies and different durations of single high-voltage pulses. At the laboratories of the Tomskiy politekhnicheskiy institut
(Tomsk Polytechnic Institute) and the Sibirskiy fiziko-tekhnichskogo institut (Siberian Institute of Physics and Technology) investigations were conducted on the dielectric properties of crystal hydrates in card 1/4

66306 SOV/143-59-5-4/19 Hydrates dependence of temperature, frequency of the electrical Electrical Properties of Crystal field, degree of dehydration, chemical composition and structure of matter. A large number of mice types of the East Siberian deposits were studied. In papers of the East Siberian deposits were studied. In papers of N.P. Bogoroditskiy and V.N. Malyshev Ref 17, S. M. Yakimets Ref 27 and M.M. Mikhaylov Ref 37 different results were obtained for carious characteristics of mica. In the papers Ref 4-107 by K.A. Vodop'yanov, A.P. Izergin, I.G. Vorozhtsova, the maxima of curves are shown representing the temperature dependencies

are shown, representing the temperature dependencies of tg & and E in the phlogopite mica, and one frequency maximum of tg 6. The dependence of tg 6 and Ein phlogopite mica frequency and temperatures are shown in graphs, Figure 1, 2 and 3. Figure 4 shows a graph of the temperature dependence of £ and tg 6

in muscovite, while Figure 5 shows the temperature dependence of muscovite before and after exposure to gamma radiation. Figures 6, 7,8, show graphs of the frequency and temperature dependencies of tg & and &

in gypsum. At the Laboratoriya TVN Tomskogo politekh nicheskogo instituta -TPI- (Laboratory TVN of the

Card 2/4

66306 SOY/143-59-5-4/19

Electrical Properties of Crystal Hydrates

Tomsk Polytechnic Institute) the electrical strength of some metal sulfates was studied, whereby the amount of water molecules in the crystal hydrates changed. Graph, Figure 9, shows magnitudes of puncturing voltages for NiSO, onH2O and CoSO, onH2O. Graph, Figure 10 shows the dependence of the electrical strength of snows the dependence of the electrical strength of laminar crystallohydrates on the lattice energy for muscovite and phlogopite (according to data of V. Bayev and M.I. Mantrov [Ref 12] and tale - according to data of K.M. Kevroleva [Ref 20]). K.M. Kevroleva obdata of K.M. Kevroleva [Ref 20]). K.M. Kevroleva obtained also volt-second characteristics of Rochelle tained also volt-second characteristics of rules. salt, talc and river ice under the influence of pulse voltages of different duration. Volt-second characteristics of Rochelle salt were also obtained by M.A. Mel'nikov at the Laboratory TVN of TPI using voltage pulses of 10-6-10-9 seconds duration. Ye.A. Konorova investigated micas pulses of 10-8-10-10 seconds. N.A. Prikhod ko and B.V. Gorelik investigated the dependence of the electric strength of Rochelle salt on the crystallographic direction. The authors also mention

Card 3/

Electrical Properties of Crystal, Mydrates

SOV/143-59-5-4/19

the work of Hackett and A.M. Thomas, IIEE /Ref 24/.
The authors state in their conclusions that a rotation of polarized molecules with a low bond energy is possible in crystallohydrates. The position of frequency and temperature maxima of tg f and & are determined by the structure of crystallohydrates.

When manufacturing electrical insulation materials composed of crystallohydrates it should be noticed that polarized molecules may cause relaxation losses and that crystal ohydrates work reliably only to the dehydration temperature. There are 11 graphs, 1 table and 24 references, 23 of which are Soviet and 1 English.

This article was presented by the kafedra tekhniki vysokikh napryazheniy

This article was presented by the Marting Chair of High Voltage Engineering).

(Chair of High Voltage Engineering).

ASSOCIATION: Tomskiy ordena Trudovogo Krasnogo Znameni politekhASSOCIATION: Tomskiy ordena Trudovogo Krasnogo Znameni politekhnicheskiy institut imeni S.M. Kirova (Tomsk - Red
nicheskiy institut imeni S.M. Kirova (Tomsk - Red
h. Kirov)

SUBMITTED: Card 4/4

November 4, 1958

d 4/4

VOROB'TEV, A.A., prof., doktor fiz.-matem.nauk; GORBUHOV, V.I., kand.
tekhn.nauk; TITOV, V.H., dotsent, kand.tekhn.nauk

Using betatrons for radiographic inspection of very thick
workpieces. Izv.vys.ucheb.sav.; mashinostr. no.5:195-202
(KIRA 13:4)

1, Tomskiy politekhnicheskiy ibstitut.
(Betatron) (Testing)

